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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/075,588   | 02/15/2002  | Hideaki Matsuhashi   | OKI.306             | 9410             |
| 7590   | 02/19/2004  |                      | EXAMINER            |                  |
| VOLENTINE FRANCOS, PLLC<br>Suite 150<br>12200 Sunrise Valley Drive<br>Reston, VA 20191 |             |                      | DEO, DUY VU NGUYEN  |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 1765                |                  |

DATE MAILED: 02/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |
|------------------------------|------------------------|---------------------|
|                              | 10/075,588             | MATSUHASHI ET AL.   |
| Examiner                     | Art Unit               |                     |
| DuyVu n Deo                  | 1765                   |                     |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 15 February 2002.

2a)  This action is **FINAL**.                            2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## **Disposition of Claims**

4)  Claim(s) 1-21 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5)  Claim(s) 1-10 is/are allowed.  
6)  Claim(s) 11-17 is/are rejected.  
7)  Claim(s) 18-21 is/are objected to.  
8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a))

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/15/02.

4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.

5)  Notice of Informal Patent Application (PTO-152)

6)  Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Mukogawa (US 5,331,193).

Mukogawa describes a method for forming field effect transistor comprising: providing an SOI structure having a silicon layer 300 formed on an insulating layer (col. 7, line 14-20, line 42-44; col. 9, line 27-29); patterning to form gate electrodes 313, 314 on the silicon layer from polycrystalline silicon (this would read on claimed etching conductive layer to form gate electrode) (col. 8, line 1-7); implanting ions into the silicon layer and annealing the silicon layer at T 600-1000 degree Celsius to form source/drain regions 315 and 316 (col. 8, line 8-14). The implantation ions each in a dose each in the range from  $10^{15}$  to  $10^{16}/\text{cm}^2$  are implanted (col. 8, line 9-11). This shows all the ions of the dose are implanted and the energy would have to be at level so that all the ions in the dose to be implanted as above.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mukogawa as applied to claim 11 above.

Mukogawa describes the method further comprising forming an insulating oxide film (claimed silicon oxide) after forming gate electrode (col. 3, line 50-52; col. 8, line 43-45). Unlike claimed invention he doesn't describe the oxide film thickness at 10-30 nm and the ion concentration is of  $10^{18}$  to  $10^{19}/\text{cm}^3$  over the silicon surface or the impurity concentration at the source and drain is set at  $10^{20}/\text{cm}^3$  or higher and at a lowest possible concentration which does not increase the contact resistance of the Co silicide and Si. However, these parameters are result-effective parameters because they have ranges to consider during the manufacturing of the transistor. Therefore, it would have been obvious for one skill in the art to determine these parameters through routine experimentation in order to obtain optimum values to form field effect transistor with a reasonable expectation of success.

### *Drawings*

5. Figure s 17-20 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to under 37 CFR 1.83(a) because they fail to show reference 5a (or silicon nitride film 5a) as described in pages 11, 14, 16, 20, and 23 of the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected

drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 17 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is unclear where in the specification disclosing the lowest possible concentration level which does not increase the contact resistance of Co silicide and Si.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "the impurity in the gate electrode becomes activated before forming gate electrode" is vague and indefinite because how can the impurity be in the gate electrode before it is even formed or existed?

***Allowable Subject Matter***

11. Claims 1-10 are allowed because applied prior art, Mukogawa, doesn't describe wet etching the nitride mask until the film thickness is reduce to allow an edge of the silicon layer contacting the filed oxide film to be exposed and implanting ions of a channel stopping impurity into the edge of the silicon layer by using the wet-etched mask.
12. Claims 14-16 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. Claims 14-16 are allowable because applied prior art doesn't describe the impurity in the gate electrode becomes activated before forming gate electrode.
13. Claims 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. Claims 18-21 are allowable because applied prior art doesn't describe the ions implanted at the source/drain is implemented twice, once at a low engery level achieving a high concentration and another time at a high energy level achieving a low concentration.
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-3:30; with alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DVD  
2/11/04

JD